# Resilience abilities of urban squares: A study in Istanbul's peripheral districts

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**Abstract.** *Urban open public spaces have a special significance in terms of resilience in cities. They work as extra room to move (Walker et al. 2004) in any case of environmental variability, such as flood, earthquake, etc. Resilience is also related with diversity, which refers to the degree of capacity for a system to adopt to a wide range of different and sometimes unpredictable circumstances (ibid). In urban morphology studies, diversity is measured by the variety of land-use, block sizes, and density.*

*This study focuses on resilience abilities of four peripheral "urban squares" in İstanbul, Turkey. These areas have retained their peripheral characteristics yet at the same time served as sub-centers for the surrounding regions. Is it possible to calculate resilience ability by morphological and space syntax analyses? Do land-use patterns affect resilience? Are there any associations between diversity in land-use and user behaviors and cognitions related to that urban public open space (spending more time, using frequently, etc.)?*

*The paper defines two variables to measure resilience in context of urban morphology: diversity and connectivity. The methodology applied in the study then includes a synthesis of three types of expertise: 1) behavioral mapping of areas (through the analysis of patterns of use based on direct observation), 2) cognitive evaluation of spaces based on perceived factors (through user questionnaires), and 3) quantifying urban public spaces objectively (through the methodology of space syntax). The results identify associations between objective characteristics of public spaces designed at the peripheral districts, patterns of use and users' perception of these areas.*

*Key Words: urban square, resilience, morphology, space syntax, periphery, Istanbul*

## 1. Introduction

This paper focuses on public open spaces, more specifically urban squares, and their resilience abilities especially under unexpected natural hazards. Resilience studies have been developed in

ecological sciences, with basic concepts of variety, diversity and capacity, while they have clear parallels in urban studies as well. Since resilience theory gives a theoretical basis for understanding social and ecological systems (SES), urban planning and urban design literature should have connections with it as these two disciplines function as an intervention tool to SES (Marcus and Colding, 2014). Resilience thinking should also be a part of planning practice to come up with a new framework to deal with increasing vulnerabilities of urban areas and insecurities of the public especially under the pressure of neoliberal politics (Eraydın, 2013). In urban design sphere, urban morphology studies have recently been concentrating on resilience theory either by focusing on certain variables of spatial form like distance, density and diversity, which point to the spatial capital of a built environment (Marcus, 2010), or specific disaster cases like earthquakes that bring about the need for questioning resilience abilities in relation to urban form (Allan *et al.*2013).

As the largest metropolitan city of Turkey with a 14 million people, Istanbul has been struggling with different urban problems. Owing to complex dynamics associated with the global and local pressures, urban change takes different forms in the city, while there are also high levels of natural hazard risks. One of the most important and urgent problems is that the city is under constant threat of severe earthquakes. Especially the districts located in the periphery have a low quality building stock and high population density, which might enlarge the impact of such a disaster. Accessing these regions from the center gets importance in hazard situations, while it is also important for the local people to gather and get organized in their districts. Hence, spatial resilience (Nyström and Folke, 2001) plays quite a significant role in adaptation and self-organization abilities of societies.

Although urban resilience is a multidimensional domain, which depends on a wide range of factors, such as political, social, environmental, and economic, the focus of this paper is in the association between social and spatial systems, between users and the built form. This is due to the assumption that the physical environment can enhance social resilience. This relationship is coined with the term *socio-spatial resilience* throughout the remainder of this essay[1].

There is limited literature that links resilience with public open spaces. In their book *Resilience Thinking*, Walker and Salt (2006) describe in detail a number of "resilience attributes": diversity, modularity, tight feedbacks, innovation, overlap in governance, ecosystem services, social capital, and allowing for variability. In this paper, the emphasis is on two major socio-spatial resilience attributes, which have direct implications to the quantitative aspects of urban form: diversity and connectivity. The aim is to evaluate and compare resilience abilities of selected urban squares by analyzing these two variables.

### 1.1. Diversity

Diversity is directly connected to the concept of "spatial diversity", here defined as the presence of heterogeneous land-uses, which can harbor, support, and develop differences in human activity (Marcus and Colding 2014:55). Diversity is considered as a major source of future options (Allan *et al.*; 2013: 247) since the more diversity there is, the better is the capacity for a system to adapt to a wide range of different and sometimes unpredictable circumstances (Walker and Salt 2006: 145). Urban form indicator of diversity is short blocks, mixed-use (Jacobs, 1993) and functional variety (Dovey and Polakit 2006; Ramirez-Lovering 2008). Diversity is critical for the ability of an urban space to spread risk, create buffers and facilitate re-organization in phases of renewal (Marcus and Colding, 2014). In this study diversity is

[1] This concept is based on the term developed by Allan *et al.*2013.

measured through the analysis of the ground-floor land-use patterns around the urban squares. Mixed and compatible land-uses would bring a variety of forms, functions, and activities to the urban streets, which would consequently play a significant role in enhancing urban resilience quality of the area.

### 1.2. Connectivity

As Salat and Bourdic (2012) argue, the evolving nature of cities is linked not only to forms and functions but also to a key element: connectivity. Connectivity can be defined as the underlying structure of urban form based on a hierarchy of configurative relations between spaces. The study of city plans affords major indications as to their type and level of connectivity. However valuable information we can get by studying the evolution of different types of individual structures, such as building, parcel and block, it is the street that is the main indicator of urban resilience. Thus, the structure of the street network is the most important variable in creating a resilient city since the smaller components can be changed without affecting the overall structure. To be deformable, the urban fabric must display a great number of connections, offering a great number of ways of getting from one point of the city to another passing through different nodes (Salat and Bourdic, 2012).

In the framework of 'socio-spatial resilience', diversity and connectivity of the physical environment can be considered as fundamental variables of spatial form with distinct relations to generic aspects of human use of urban space: in principle, spatial diversity as the diversity of land-uses, and spatial connectivity as the degree of accessibility. Hence, this provides the possibility to talk about these as measures of cities as a multitude of locations with distinctly different spatial potentials for human activity (Marcus 2010).

### 1.3. Space syntax: the configurative analysis of urban space

Space syntax, theory and set of techniques for analyzing spatial configurations at various scales, is a promising approach for measuring spatial diversity and connectivity and the degree to which they are associated with human activity (Hillier and Hanson 1984). Space syntax offers a rich set of analytical measures on the cognitive scale of urban space. The most important one is the "axial map" or the "segment map", which models the urban space through network representation of open public spaces based on graph theory from the point of view of the human being as s/he cognizes the space. This type of representation of urban space offers a quantitative analysis of spatial layouts. The axial map consists of the fewest longest straight lines (axial lines) covering all urban public spaces. Each axial line represents a line of sight and access as offered by the environment to humans who are static or in movement in the system. Thus, the axial map both defines the cognitive scale of the urban space it represents, and allows for the systematic quantification of this network. Research using space syntax have demonstrated strong correlations between spatial form and pedestrian movement (Hillier et al. 1993, Hillier and Iida 2005) as well as other urban phenomena, such as land-use distribution (Scoppa and Peponis 2015), land prices (Ruilan and Xinqi 2004), and crime (Baran *et al.* 2007).

## 2. Methodology

A significant difficulty within urban resilience studies is in evaluating the interrelationship between the above-mentioned measures and human activity. Very few studies have looked into the degree to which spatial diversity and connectivity are associated with the ways in which urban form is associated with user behavior in real case studies (Allan *et al.* 2013). This is due to the fact that it is very time consuming and costly to collect data on actual user behaviors in urban settings. Thus, conclusions on the extent to which urban resilience factors influence human behavior –both cognitively and behaviorally– are still inconclusive. This study aims to bridge these gaps by including a synthesis of three types of expertise: 1) behavioral mapping of

areas (through the analysis of patterns of use based on direct observation), 2) cognitive evaluation of spaces based on perceived factors (through user questionnaires), and 3) quantifying urban public spaces objectively (through the methodology of space syntax and urban morphology). The aim is to better understand how urban resilience measurements, as defined in the literature, are associated with how users think about and act in urban space. The research questions can be listed as: Is it possible to calculate resilience ability by morphological and space syntax analyses? Do land-use patterns affect resilience? Are there any associations between diversity in land-use and user behaviors and cognitions related to that urban open public space (spending more time, using frequently, etc.)?

### 2.1. Study Areas

This study is concerned with resilience abilities of urban squares through the concepts of diversity and connectivity. Within this scope, four urban squares located at the different peripheral municipalities of İstanbul's European part are selected as the study sample. These areas –Küçükçekmece Urban Square, Avcılar Urban Square and Street Redevelopment, Büyükçekmece Urban Square, and Beylikdüzü Urban Square– were specifically chosen due to the fact that they are located in districts which have grown towards the periphery between 1980 and 2000 parallel to E-5 highway and that have dominated the macro-form of the city. After 2000s, these districts have retained their peripheral characteristics yet at the same time served as sub-centers for the surrounding regions. They also carry higher level of earthquake damage risk comparing to other regions. Figure 1 shows the four study areas on the map of Istanbul and Figure 2 demonstrates the squares within their immediate urban context.


**Figure 1.** Selected case study areas located within Istanbul. The black line demarcates the E5 highway.


**Figure 2.** Study areas within their immediate urban context.

### 2.2. Measures

As 800 meters, a 10-minute walking distance is considered as the walking threshold that people are willing to walk between origins and destinations within the city, urban form within 800meter radius buffers around the urban squares is studied in this paper. The term 'square-areas' is used to indicate these buffers from here on.

*Diversity: Land-use*

In this paper 'spatial diversity', that is the division of land into few or many spaces, i.e., plots or parcels, is measured through ground-floor land-use compositions within the square-areas. Density of total land-uses as well as residential, non-residential (office + retail + commercial) and recreational land-uses are calculated separately within square-areas. Figure 3 shows the composition of land-uses within these areas. The study focuses on ground floor land-uses only since non-residential uses located on the ground floor act as 'movement attractors'.

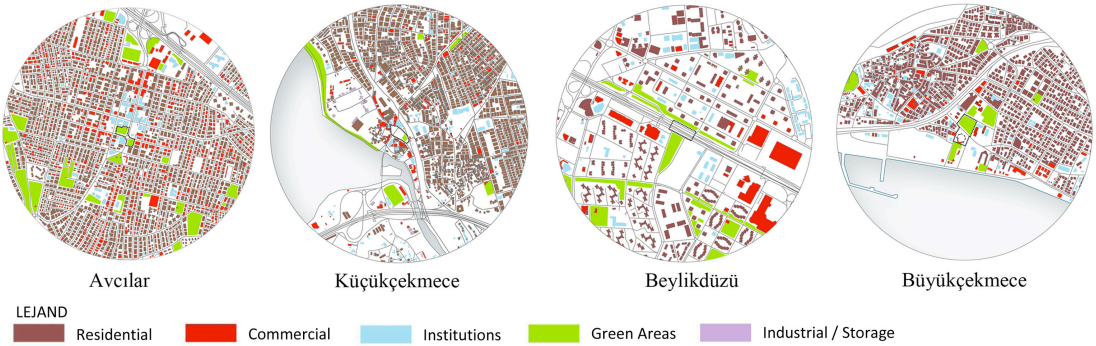


**Figure 3.** Land-use compositions within the square-areas.

*Connectivity: Street network configuration*

The connectivity pattern of street network within the study areas are evaluated using two basic descriptors of spatial structure of street networks applied in Space Syntax literature. *Connectivity* measures the number of spaces (streets segments) intersecting each space within the system. Segment Angular *Integration* measures how accessible each space is from all the others within the radius using the least angle measure of distance. Integration (radius n) for 800meter radii was calculated separately. Figure 4 demonstrates the street network configuration of Avcılar and Küçükçekmece square-areas using these two measures.

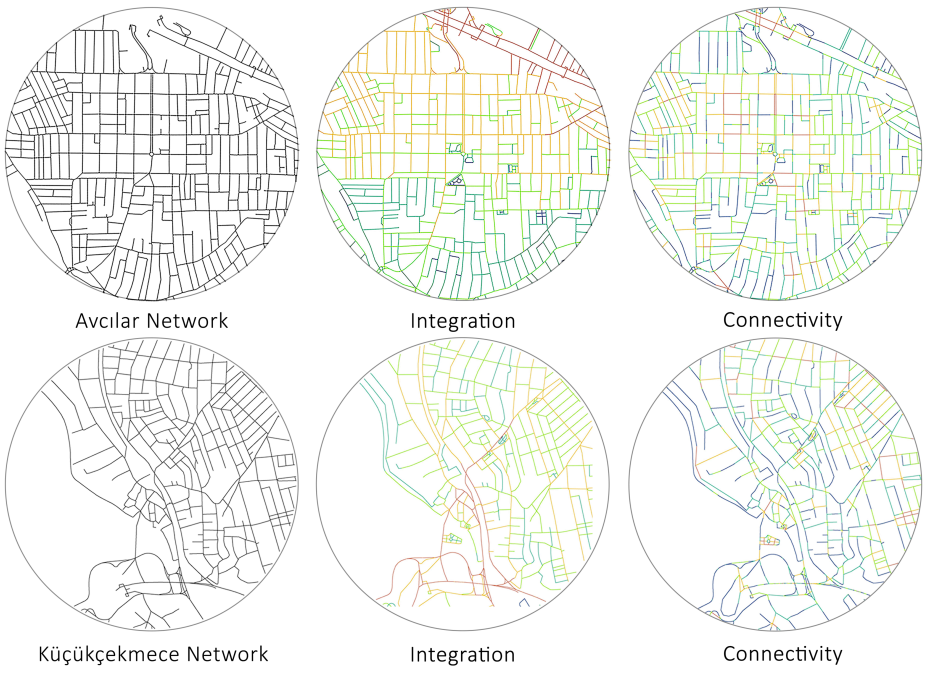


**Figure 4.** Avcılar and Küçükçekmece square-areas (800 meter circular buffer) represented with street network centerlines, Integration, and Connectivity measures.

If we are analyzing resilience abilities of public open spaces specifically under crisis, connectivity analysis as developed in Space Syntax would provide us accessibility potentials of nearby population to that open space in conditions of crisis. Nevertheless, evaluating connectivity through street network configuration only may not be adequate in order to understand this capability. It would be better to evaluate it along with population density variable, which might be termed as "connectivity of density".

*Cognitive level of urban space*

Face-to-face questionnaires were conducted with randomly selected users within the 4 squares during November and January 2016 on different days (both weekday and weekend) and time periods. 170 to 180 users were surveyed within each square. Questionnaires include questions regarding (i) socio-demographic characteristics; (ii) the purpose and frequency of using the square; (iii) access mode and walking distance to the square; and (iv) accessibility to the surrounding context, such as ease of walking, distance between intersections, and land-use diversity within 10 minute walking distance.

*User behavior-diversity of activities*

User behavior was measured through direct observations within 10-minute intervals using the methodology developed by Goličnik Marušić and Marušić (2012). Spatial behavior mapping was conducted for both passive and active occupancies within the squares on multiple days (weekend and weekday), repeated over 5 time intervals during one day. Figure 5 displays the set of activities along with their symbols recorded in Küçükçekmece square for one observation session. Activities are grouped under two categories, primary and secondary. Primary activities include walking, sitting, lying down, and standing. Secondary activities include sleeping, conversing, smoking and watching around.


**Figure 5.** Primary and secondary activities, including their attached symbols, specifying male and female users, used for recording activities in Küçükçekmece square within one observation session.

### 2.3. Analysis

Descriptive analyses from the questionnaires and user activities are compared against the urban form measures for each square-area to identify the associations of factors related to urban resilience to human behavior. Hence, subjective and objective environmental data on urban spaces are evaluated simultaneously.

## 3. Results

### 3.1. Descriptive urban form characteristics of square-areas

Table 1 summarizes urban form characteristics of study areas. Results indicate that Avcılar includes the shortest average block size with highest total street length and total number of segments, while Beylikdüzü has the largest average block size with the least amount of street segments within its buffer. Similarly, Avcılar has the highest number of intersections within its buffer whereas Beylikdüzü has the lowest. Küçükçekmece and Büyükçekmece square-areas are comparable in terms of intersection density. In terms of connectivity, Avcılar and Küçükçekmce are the most integrated public spaces within their urban context. Average connectivity values of all square-areas are comparable, with Avcılar having the highest average street connectivity within its buffer.

**Table 1.** Descriptive statistics summarizing urban form within study areas.

| | Avcılar | Beylikdüzü | Küçükçekmece | Büyükçekmece |
|---|---|---|---|---|
| **Morphology** | | | | |
| avg. block size (m) | 57 | 82 | 62 | 61 |
| total street length (m) | 56.286 | 43.282 | 44.035 | 35.049 |
| total # street segments | 967 | 456 | 659 | 563 |
| total # of intersections | 394 | 168 | 260 | 262 |
| **Connectivity** | | | | |
| avg. Integration (n) | 8.914 | 7.741 | 9.613 | 6.532 |
| avg. Connectivity (n) | 3,34 | 3,15 | 3,12 | 3,3 |
| **Diversity ($m^2$)** | | | | |
| total land-use density | 604.300 | 455.033 | 476.974 | 411.491 |
| total residential density | 302.150 | 268.469 | 381.579 | 320.963 |
| total retail density | 151.075 | 59.154 | 38.158 | 32.919 |
| total recreational density | 114.817 | 100.107 | 38.158 | 41.149 |
| **Population (persons)** | 88.854 | 115.994 | 49.895 | 62.885 |

When the ground-floor land-use percentages are analyzed (Figure 6), Avcılar appears to include the most diverse land-use distribution, while Küçükçekmece and Büyükçekmece are predominantly residential. Beylikdüzü seems to possess similar densities of ground floor percentages to Avcılar. However, while the latter includes a fine-grained land-use pattern, Beylikdüzü encompasses coarse-grained active ground floor uses (i.e. large shopping malls).

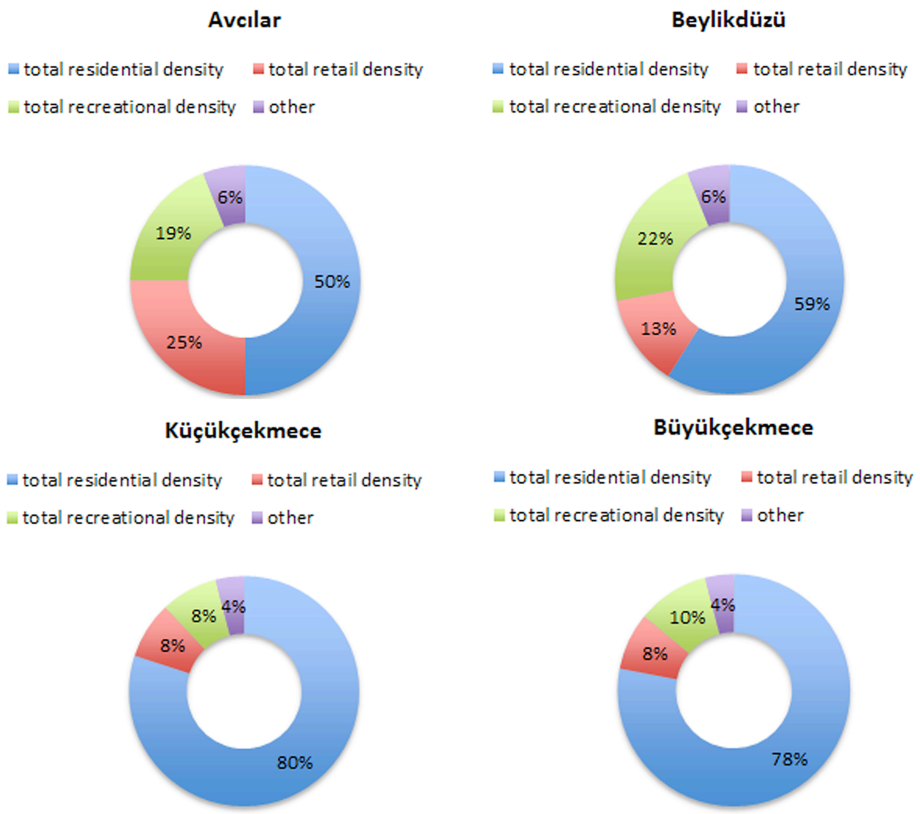


**Figure 6.** Land-use distributions within 800meter circular buffers of selected squares.

### 3.2. Cognitive scale of square-areas

Table 2 lists the preliminary findings summarizing the percentages obtained from the user questionnaires in each square. According to these results, percentage of access to squares via public transportation is highest for Beylikdüzü Square, which is located directly on a bus rapid transit (*Metrobus*) route. Yet, auto access to this square is the highest as well. The rate of people walking to the square is highest for Küçükçekmece Square, while this rate is lowest for Beylikdüzü and Avcılar Squares.

The walking catchment area, the distance people are willing to walk to the squares, is highest for Avcılar (half of the participants walks between 800 and 1600 meters, and approximately 12% walk more than 1600 meters). Contrarily, the results indicate that participants perceive the surroundings of this square as the least walkable among the four square-areas. Similarly, the frequency of use is highest for Avcılar and Küçükçekmece (daily use) while the length of occupancy is the highest for Avcılar square (more than ⅗of participants occupy the square between 1 and 2 hours, and more than ⅕ stay 2 to 4 hours). On the contrary, Büyükçekmece and Beylikdüzü appear to have the lowest length of occupancy, with almost 40% of users spending less than an hour and half of them spending only 1 to 2 hours. In addition, users' rate of preference of squares as places for socio-cultural activities and socializing is highest for Avcılar. Avcılar is also the most appreciated square whereas Küçükçekmece and Beylikdüzü are the least preferred. Surprisingly, accessibility to land-uses are perceived to be the lowest for Avcılar while users believe to have access to many shops and places within 5 to 10 minutes walking distance to Beylikdüzü and Büyükçekmece.

**Table 2.** Preliminary findings indicating percentages obtained from the user questionnaires in each square.

| | Avcılar | Beylikdüzü | Küçükçekmece | Büyükçekmece |
|---|---|---|---|---|
| Access mode | | | | |
| public transportation | 52,8 | 58 | 45,2 | 54,2 |
| auto | 15 | 10,1 | 6,2 | 8,9 |
| walking | 32,2 | 32 | 48,6 | 36,9 |
| Walking distance | | | | |
| <800m. | 36,4 | 70,9 | 59,1 | 64,6 |
| 800-1600m. | 51,8 | 25,5 | 39,8 | 29,2 |
| >1600m. | 11,8 | 3,6 | 1,1 | 6,2 |
| Aim of use | | | | |
| socio-cultural | 13,9 | 8,3 | 4,5 | 8,4 |
| socializing | 11,6 | 4,7 | 5,6 | 4,5 |
| Frequency of use | | | | |
| daily | 33,7 | 31,5 | 35,6 | 30,7 |
| weekly | 37,8 | 40,5 | 36,7 | 49,2 |
| monthly | 25,6 | 25 | 15,8 | 12,3 |
| annually | 3,5 | 3 | 11,9 | 7,8 |
| Length of occupancy | | | | |
| <1hr | 3,6 | 36,3 | 41,8 | 21,8 |
| 1-2hr | 64,5 | 53,6 | 43,5 | 58,7 |
| 2-4hr | 23,1 | 8,3 | 10,7 | 15,1 |
| 4-6hr | 1,8 | 1,2 | 2,3 | 3,4 |
| >6hr | 7,1 | 1,2 | 1,7 | 1,1 |
| Appreciate the space | | | | |
| SA | 44,5 | 0,6 | 15,8 | 11,2 |
| A | 45,7 | 44,4 | 64,4 | 35,2 |
| D | 4,6 | 33,7 | 4 | 30,2 |
| SD | 0 | 17,8 | 8,5 | 17,2 |
| Easy to access | | | | |
| SA | 33.3 | 34,9 | 25,4 | 32,4 |
| A | 28,1 | 47,9 | 44,6 | 38,5 |
| D | 14,6 | 1,2 | 13,6 | 5,6 |

| | | | | | |
|---|---|---|---|---|---|
| | SD | 6,4 | 0 | 1,13 | 3,9 |
| Walkable | | | | | |
| | SA | 21,6 | 20,1 | 47,4 | 52,3 |
| | A | 29,9 | 58,6 | 24,6 | 26,1 |
| | D | 15,6 | 4,1 | 10,9 | 8,5 |
| | SD | 10,2 | 1,2 | 4,6 | 2,3 |
| Short intersections | | | | | |
| | SA | 16,2 | 17,9 | 39,5 | 47,2 |
| | A | 32,9 | 66,7 | 39,5 | 34,7 |
| | D | 18,5 | 2,3 | 6,4 | 4 |
| | SD | 2,9 | 0 | 2,9 | 1,1 |
| Many shops w/in10min walking | | | | | |
| | SA | 41 | 16,7 | 48,9 | 38,8 |
| | A | 29,5 | 73,2 | 39,2 | 46,1 |
| | D | 5,2 | 1,8 | 1,1 | 2,8 |
| | SD | 3,5 | 0 | 6,25 | 3,4 |
| Many activities w/in10min walking | | | | | |
| | SA | 37,6 | 18,6 | 22,9 | 24,6 |
| | A | 31,8 | 56,9 | 53,7 | 52 |
| | D | 11 | 2,4 | 4 | 1,1 |
| | SD | 4 | 0,6 | 1,7 | 1,1 |
| Gender | | | | | |
| | F | 35,8 | 37,9 | 37,9 | 40,8 |
| | M | 64,2 | 62,1 | 62,1 | 59,2 |
| Education | | | | | |
| | <collage | 82,1 | 74 | 79 | 76,5 |
| | >collage | 17,9 | 26 | 21 | 23,5 |
| N | | 173 | 169 | 177 | 179 |

SA: Strongly Agree; A: Agree; D: Disagree; SD: Strongly Disagree
For the purpose of this table, N (Neutral) values are not reported here.

### 3.3. User behavior in selected squares

Observations on user behaviors in selected urban squares show that Büyükçekmece square is an under-used open urban public space. This square has the least intensity in usage among the four areas. The variety of activities is limited within the square. The space is used mostly as a transition zone, where uses such as sitting or lying down are less likely to occur, while the recreational park attached to it is mostly used for long-stay passive activities, including sitting, resting, and conversing.

Similarly, Beylikdüzü square is predominantly used as a transition space, which is in conformity with the frequency of use and length of occupancy. Since this square offers few street elements (i.e. benches, kiosks) and limited variety in its functional spaces (i.e. playground) and is just located above a bus rapid transit route, there is limited variety of passive activities, such as sitting in trellises. Limited long-term active uses mostly include roller-skating and skateboarding.

Küçükçekmece square is mostly used for sitting and conversing by the elderly population. Hence, there is limited variety of activities. The primary activities mostly include the passive occupancy of sitting, while the secondary activities consist mainly of conversing. Even though the perimeter of the square is used as a transition route between origin and destination, the square itself serves as a space for passive usage (sitting on benches within the square), as represented by Figure 5.

Behavior mapping shows that Avcılar square has the highest intensity of usage both in short-and long-term stay. While the center of the square is used as a transition zone, the recreational park and the cafeteria area within the square are predominantly used for long-term secondary activities, including a wide range of active uses, such as children at play, and passive activities,

such as sitting and reading news paper, eating/drinking, conversing and photographing. Behavioral patterns show that activities are well distributed within the square.

## 4. Conclusion

The results of urban form characteristics of square-areas, their cognitive scale, and user behavior within the squares indicate that there is a strong correlation between these two sets of measurements of open public spaces. For example, the variety of primary and secondary activities within the square as well as the length of occupancy and level of appreciation are highest for Avcılar square, which is most integrated within its urban surroundings with reduced average block size. Similarly, Avcılar square, which has the highest number of street segments and total length of street, has the highest average walking distances among the four selected areas. Users, on the other hand, choose to spend less time in Beylikdüzü square, which has increased average block sizes and reduced Integration within its 800-meter radius buffer. Thus, it can be claimed that the increased integration of the square with its urban context (a 10 minute walking area or 800 meter radius) stimulates its users to be there and to use it for their pastime.

The findings of this research can be grouped under two main headings.

*1. When addressing usage-spatial relationships in open urban public design, spatial configuration of spaces within their urban context becomes important.* Based on the analyses conducted within this paper, spatial connectivity as measured by space syntax measures appears to be an explanatory measure assessing the potentiality of public open spaces for socio-spatial resilience. Connectivity provides us the strength of that urban square in terms of its connections to the nearby built-up environment. In case of emergency, for instance, easy access is important and connectivity would identify the accessibility pattern. Integration provides us the ability of that square to get connected with other parts of the city, which is again very important in disaster situations. These findings complement earlier research indicating that streets, which are highly integrated in the street system, attract a lot of movement (Hillier et al. 1993), but also significantly contribute to usage-spatial relationships.

At that point, we suggest a new term "connectivity of density", which defines the extent to which street connectivity is supported by high urban population density, seems to be an appropriate measure evaluating spatial resilience of physical environment. Under the light of this interpretation, we can say that number of streets connected to a specific urban square as well as the density of population living around it are important criteria in measuring socio-spatial resilience of public open spaces. We only analyzed population density (Table 1), and we see that in dense communities, like Avcılar, urban squares in mixed-use downtowns have a vital role in risk moments. In dense but loose-street pattern communities, like Beylikdüzü, urban squares do not function as the main gathering spaces. One reason is that this kind of settlements represent coarse-grain lots and point-block isolated building morphology, which destroy walkable environments. Therefore, morphology is the first parameter that effects resilience, while density can be considered as a complementary parameter.

2. *Diversity, as measured through the variety of land-uses, allows planners/designers to investigate the ability of the built environment to transform into a different land-use model and to sustain the activities of the city at a moment of crisis.* When the distribution of land-uses is analyzed, Avcılar has relatively increased diversity of uses within its 800meter buffer. This is in conformity with the cognitive level and behavioral patterns of urban space. Thus, it may be claimed that closed, homogenous communities appear to be rather static with limited capacity for transformation. Those with relatively diverse land-use distributions, on the other hand, appear to have increased potentiality for spatial re-configuration. However; the distribution of

land-uses within an urban space should be considered along with the grain of parcels, because as it is the case with Avcılar square-area, a more fine-grained land division seems to increase the ability to self-organize and survive in times of hazard.

This study significantly contributes to the methodology applied in studies on the analysis of open urban spaces, such as urban squares. A shortcoming of related studies is their tendency to investigate urban spaces as singular entities within their physical boundaries, isolated from their urban context. However, spatial performance is actually associated with the character of an entire area —a neighborhood or a district. Hence, user behavior prevalent in an area cannot be described by analyzing the urban area isolated from its global surroundings. The methodology applied in this study allows for the consideration of the spatial configuration of urban areas within their urban context, which has both theoretical and practical implications for design of open public spaces.

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